

DURABILITY STUDIES OF SPENT
MUSHROOM COMPOST ASH (SMCA) AS
PARTIAL CEMENT REPLACEMENT
IN CONCRETE

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SUPERVISOR'S DECLARATION

I hereby declare that I have checked this thesis and in my opinion, this thesis is adequate in terms of scope and quality for the award of the degree of Bachelor of Engineering (Hons) Civil Engineering.

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STUDENT'S DECLARATION

I hereby declare that the work in this thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Universiti Malaysia Pahang or any other institutions.

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TABLE OF CONTENT

DECLARATION

TITLE PAGE

ACKNOWLEDGEMENTS **ii**

ABSTRAK **iii**

ABSTRACT **iv**

TABLE OF CONTENT **v**

LIST OF TABLES **viii**

LIST OF FIGURES **ix**

LIST OF SYMBOLS **x**

LIST OF ABBREVIATIONS **xi**

CHAPTER 1 INTRODUCTION **1**

1.1 Introduction 1

1.2 Background of Study 2

1.3 Problem Statement 2

1.4 Objectives 3

1.5 Scope of Work 3

1.6 Research Significance 4

CHAPTER 2 LITERATURE REVIEW **5**

2.1 Introduction 5

2.2 Malaysia Mushroom Industry 6

2.3 Waste from Mushroom Industry 6

2.4	Waste Issue in Malaysia	7
2.5	Cement	8
2.6	Aggregates	9
2.7	Mixing Water for Concrete	10
2.8	Durability Characteristics	10
2.8.1	Water Absorption	10
2.8.2	Sorptivity	11
2.8.3	Acid Attack	11
2.8.4	Sulphate Attack	12
2.8.5	Chloride Attack	14
CHAPTER 3 METHODOLOGY		16
3.1	Introduction	16
3.2	Materials and Properties	17
3.2.1	Cement	17
3.2.2	Coarse Aggregate	17
3.2.3	Fine Aggregate	17
3.2.4	Water	18
3.2.5	Spent Mushroom Compost Ash	18
3.3	Concrete Mixing	18
3.4	Concrete Casting	19
3.5	Curing Process	19
3.6	Slump Test	19
3.7	Compression Test	20
3.8	Water Absorption Test	21
3.9	Sorptivity	22

3.10	Acid Resistance	24
3.11	Sulphate Resistance	24
3.12	Chloride Resistance	24
CHAPTER 4 RESULTS AND DISCUSSION		25
4.1	Introduction	25
4.2	Compression Test	25
4.3	Water Absorption	26
4.4	Sorptivity	27
4.5	Acid Resistance	29
4.6	Sulphate Resistance	31
4.7	Chloride Resistance	34
CHAPTER 5 CONCLUSION AND RECOMMENDATIONS		37
5.1	Introduction	37
5.2	Conclusion	37
5.3	Recommendation for Future Research	38
REFERENCES		39
APPENDIX A COMPRESSIVE STRENGTH RESULT		43
APPENDIX B WATER ABSORPTION RESULT		44
APPENDIX C SORPTIVITY RESULT		45
APPENDIX D ACID RESISTANCE RESULT		48
APPENDIX E SULPHATE RESISTANCE RESULT		49
APPENDIX F CHLORIDE RESISTANCE RESULT		50
APPENDIX G PHOTOS OF LABORATORY WORKS		51

LIST OF TABLES

Table 2.1	Types of Cement	8
Table 4.1	Compressive Strength of Normal Concrete and SMCA Concrete at 28 Days	25
Table 4.2	Water Absorption of Normal Concrete and SMCA Concrete	26
Table 4.3	Percentage Loss in Weight and Compressive Strength of Normal Concrete and SMCA Concrete after 90 days Acid Immersion.	30
Table 4.4	Percentage Gain in Weight and Compressive Strength of Normal Concrete and SMC Concrete after 90 Days Sulphate Immersion	32
Table 4.5	Percentage Gain in Weight and Average Compressive Strength after 28 Days Chloride Immersion	34

LIST OF FIGURES

Figure 2.1	Malaysia Mushroom Production 2012-2015	6
Figure 3.1	YTL ORANG KUAT Ordinary Portland Cement	17
Figure 3.2	Spent Mushroom Compost Ash (SMCA)	18
Figure 3.3	Compressive Strength Machine	20
Figure 3.4	Water Absorption Test	22
Figure 3.5	Epoxy Resin	23
Figure 3.6	Sorptivity Test	23
Figure 4.1	Water Absorption of Normal Concrete and SMCA Concrete	27
Figure 4.2	Absorption Plotted Against Square Root of Time for Normal Concrete and SMCA Concrete	28
Figure 4.3	Sorptivity of Normal Concrete and SMCA Concrete.	28
Figure 4.4	Physical Changes of Normal Concrete Before Immersion (left) and After Immersion in 5 % Hydrochloric Acid (right).	30
Figure 4.5	Physical Changes of SMCA Concrete Before Immersion (left) and After Immersion in 5 % Hydrochloric Acid (right).	30
Figure 4.6	Percentage Loss in Weight Due to Acidity	31
Figure 4.7	Physical Changes of Normal Concrete Before Immersion (left) and After Immersion in 5 % Sodium Sulphate (right).	32
Figure 4.8	Physical Changes of SMCA Concrete Before Immersion (left) and After Immersion in 5 % Sodium Sulphate (right).	32
Figure 4.9	Percentage Gain in Weight Due to Sulphate.	33
Figure 4.10	Physical Changes of Normal Concrete Before Immersion (left) and After Immersion in 5 % Sodium Chloride (right).	34
Figure 4.11	Physical Changes of SMCA Concrete Before Immersion (left) and After Immersion in 5 % Sodium Chloride (right).	34
Figure 4.12	Percentage Gain in Weight Due to Chloride	35

LIST OF SYMBOLS

g	gram
m	Meter
°C	Degree Celcius
ha	hectare
mm	Millimetre
%	percent
kg	kilogram
µm	micrometer
N/mm ²	Newton per millimeter square
N/(mm s)	Newton per millimetre second
MPa	Megapascal
N	Newton
mm ²	Millimetre square
h	Hour
mm/√min	Millimetre per minute square
g/cm ³	Gram per centimetre square
cm ²	Centimetre square
min	Minute
±	Plus minus
pH	Potential of hydrogen

LIST OF ABBREVIATIONS

Al_2O_3	Aluminium Oxide
ACI	American Concrete Institute
ASTM	American Society for Testing and Materials
BS	British Standard
BRE	Building Research Establishment
CaCl_2	Calcium Chloride
Ca(OH)_2	Calcium Hydroxide
Ca^{2+}	Calcium Ion
CaO	Calcium Oxide
CEN/TR	European Committee for Standardization Technical Report
CS	Calcium Sulphate
C-S-H	Calcium-Silicate-Hydrate
C_3A	Tricalcium Aluminate
C_2S	Dicalcium Silicate
C_3S	Tricalcium Silicate
DOA	Department of Agriculture
EN	European Standards
Fe(OH)_2	Iron (II) Hydroxide
H^+	Hydrogen Ion
HA	Mono-proton Acid
H_2O	Water
H_2S	Hydrogen Sulphide
MSW	Municipal Solid Waste
Na_2SO_4	Sodium Sulphate
OPC	Ordinary Portland Cement
PFA	Pulverized Fuel Ash
SiO_2	Silicon dioxide
Si(OH)_4	Silicic Acid
SMC	Spent Mushroom Compost
SMCA	Spent Mushroom Compost Ash
SO_4^{2-}	Sulphate Anion
XRD	X-ray Diffraction